

## 0.a. Goal

Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture

## 0.b. Target

Target 2.1: By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round

## 0.c. Indicator

Indicator 2.1.2: Prevalence of moderate or severe food insecurity in the population, based on the Food Insecurity Experience Scale (FIES)

## 0.d. Series

Prevalence of moderate or severe food insecurity in the adult population (%)

Prevalence of severe food insecurity in the adult population (%)

Total population in moderate or severe food insecurity (thousands of people)

Total population in severe food insecurity (thousands of people)

## 0.e. Metadata update

2022-03-31

## 0.f. Related indicators

2.1.1, 2.2.1, 2.2.2, 2.2.3

Comments:

Links with Target 2.2, to the extent that hunger may lead to malnutrition, and Target 2.2 may not be achieved if Target 2.1 is not achieved.

## 0.g. International organisations(s) responsible for global monitoring

Food and Agriculture Organisation of the United Nations (FAO)

## 1.a. Organisation

## 2.a. Definition and concepts

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### Definition:

The indicator measures the percentage of individuals in the population who have experienced food insecurity at moderate or severe levels during the reference period. The severity of food insecurity, defined as a latent trait, is measured on the Food Insecurity Experience Scale global reference scale, a measurement standard established by FAO through the application of the Food Insecurity Experience Scale in more than 140 countries worldwide, starting in 2014.

### Concepts:

Extensive research over more than 25 years has demonstrated that the inability to access food results in a series of experiences and conditions that are fairly common across cultures and socio-economic contexts and that range from being concerned about the ability to obtain enough food, to the need to compromise on the quality or the diversity of food consumed, to being forced to reduce the intake of food by cutting portion sizes or skipping meals, up to the extreme condition of feeling hungry and not having means to access any food for a whole day. Typical conditions like these form the basis of an experience-based food insecurity measurement scale. When analysed through sound statistical methods rooted in Item Response Theory, data collected through such scales provide the basis to compute theoretically consistent, cross country comparable measures of the prevalence of food insecurity. The severity of the food insecurity condition as measured by this indicator thus directly reflects the extent of households' or individuals' inability to regularly access the food they need.

## 2.b. Unit of measure

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Prevalence of food insecurity: Percent (%)

Number of food insecure people: Millions (of people)

## 2.c. Classifications

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The construction of the regional and global estimates, as well as estimates for specific groups, such as Least Developed Countries, Land Locked Developing countries, Small Island Developing States, Developed Regions, and Developing Regions, of this indicator follows the UN M49 Standard.

## 3.a. Data sources

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Data can be collected using the Food Insecurity Experience Scale survey module (FIES-SM) developed by FAO, or any other experience-based food security scale questionnaires, including:

- the Household Food Security Survey Module (HFSSM) developed by the Economic Research Service of the US Department of Agriculture, and used in the US and Canada,
- the Latin American and Caribbean Food Security Scale (or Escala Latinoamericana y Caribeña de Seguridad Alimentaria – ELCSA), used in Guatemala and tested in several other Spanish speaking countries in Latin America,

- the Mexican Food Security Scale (or Escala Mexicana de Seguridad Alimentaria, - EMSA), an adaptation of the ELCSA used in Mexico,
- the Brazilian Food Insecurity Scale (Escala Brasileira de medida de la Insegurança Alimentar – EBIA) used in Brazil, or
- the Household Food Insecurity Access Scale (HFIAS),

or any adaptation of the above that can be calibrated against the global FIES.

Two versions of the FIES-SM are available for use in surveys of individuals or households respectively, and the difference stands in whether respondents are asked to report only on their individual experiences, or also on that of other member of the household.

The current FIES-SM module include eight questions as in the table below.

GLOBAL FOOD INSECURITY EXPERIENCE SCALE	
Now I would like to ask you some questions about food.	
Q1. During the last 12 MONTHS, was there a time when you (or any other adult in the household) were worried you would not have enough food to eat because of a lack of money or other resources?	0 No 1 Yes 98 Don't Know 99 Refused
Q2. Still thinking about the last 12 MONTHS, was there a time when you (or any other adult in the household) were unable to eat healthy and nutritious food because of a lack of money or other resources?	0 No 1 Yes 98 Don't Know 99 Refused
Q3. And was there a time when you (or any other adult in the household) ate only a few kinds of foods because of a lack of money or other resources?	0 No 1 Yes 98 Don't Know

	99 Refused
Q4. Was there a time when you (or any other adult in the household) had to skip a meal because there was not enough money or other resources to get food?	0 No 1 Yes 98 Don't Know 99 Refused
Q5. Still thinking about the last 12 MONTHS, was there a time when you (or any other adult in the household) ate less than you thought you should because of a lack of money or other resources?	0 No 1 Yes 98 Don't Know 99 Refused
Q6. And was there a time when your household ran out of food because of a lack of money or other resources?	0 No 1 Yes 98 Don't Know 99 Refused
Q7. Was there a time when you (or any other adult in the household) were hungry but did not eat because there was not enough money or other resources for food?	0 No 1 Yes 98 Don't Know 99 Refused

Q8. Finally, was there a time when you (or any other adult in the household) went without eating for a whole day because of a lack of money or other resources?	0 No
	1 Yes
	98 Don't Know
	99 Refused

The questions should be adapted and administered in the respondents' preferred language and enumerators instructed to make sure that respondents recognize the reference period and the qualifier according to which experiences should be reported only when due to "lack of money or other resources" and not, for example, for reasons related to health or other cultural habits (such as fasting for religious credos).

The FIES-SM can be included in virtually any telephone-based or personal interview-based survey of the population, though face to face interview is preferred.

Since 2014, the individual referenced FIES-SM is applied to nationally representative samples of the population aged 15 or more in all countries covered by the Gallup World Poll (more than 140 countries every year, covering 90% of the world population). In most countries, samples include about 1000 individuals (with larger samples of 3000 individuals in India and 5000 in mainland China).

Additionally to the GWP, in 2020 FAO collected data in 20 countries through Geopoll® with the specific objective of assessing food insecurity during the COVID-19 pandemic. The countries covered were: Afghanistan, Burkina Faso, Cameroon, Central African Republic, Chad, Democratic Republic of the Congo, El Salvador, Ethiopia, Guatemala, Haiti, Iraq, Liberia, Mozambique, Myanmar, Niger, Nigeria, Sierra Leone, Somalia, South Africa and Zimbabwe. For all these countries, the 2020 assessment was based on Geopoll data.

Other national surveys exist that already collect FIES compatible data.

For Afghanistan, Angola, Armenia, Botswana, Burkina Faso, Cabo Verde, Canada, Chile, Costa Rica, Ecuador, Fiji, Ghana, Greece, Grenada, Honduras, Indonesia, Israel, Kazakhstan, Kenya, Kiribati, Kyrgyzstan, Lesotho, Malawi, Mauritania, Mexico, Morocco, Namibia, Niger, Nigeria, Palestine, Philippines, Republic of Korea, Russian Federation, Saint Lucia, Samoa, Senegal, Seychelles, Sierra Leone, South Sudan, Sudan, Tonga, Uganda, United Republic of Tanzania, United States of America, Vanuatu, Viet Nam and Zambia, national government survey data were used to calculate the prevalence estimates of food insecurity by applying FAO's statistical methods to adjust national results to the same global reference standard, covering approximately a quarter of the world population. Countries are considered for the year/years when national data are available, informing the regional and subregional aggregates assuming a constant trend in the period 2014–2020, or integrating the remaining years with GWP or Geopoll data in case they were compatible. Exceptions to this rule are: Armenia, Botswana, Burkina Faso, Chile, Costa Rica, Ecuador, Ghana, Honduras, Indonesia, Israel, Malawi, Namibia, Niger, Nigeria, Sierra Leone, Uganda and Zambia. In these cases, the following procedure was followed:

- Use national data collected in one year to inform the corresponding year.
- For the remaining years, apply the smoothed trend coming from the data collected by FAO through the Gallup© World Poll to the national data to describe evolution over time. Smoothed trend is computed by taking the mean of the rates of change between consecutive three-year averages.

The motivation behind this procedure was the strong evidence found in support of the trend suggested by data collected by FAO (for instance, evolution of poverty, extreme poverty, employment, food inflation, among others), allowing to provide a more updated description of the trend in the period 2014–2020.

In Indonesia, Kazakhstan, Kyrgyzstan, Mauritania, Nicaragua, Paraguay, Rwanda, Seychelles, Sudan and United Republic of Tanzania, due to lack of data in 2020, the corresponding subregional trend between 2019 and 2020 was used to inform 2020.

#### Obtaining internationally comparable data for global monitoring:

To ensure comparability of the FImod+sev and FIsev indicators computed for different populations, universal thresholds are defined on the FIES global reference scale and converted into corresponding values on the “local” scales obtained as a result of application of the Rasch model on any specific population, through a process of “equating”.

Equating is a form of standardization of the metric based on identification of the subset of items that can be considered common to the global FIES and the specific scale used for measurement in each context. The severity levels associated with the common items are used as anchoring points to adjust the global FIES thresholds to the local scales. The standardization process ensures that the mean and standard deviation of the set of common items is the same when measured on the global FIES or on the national scale. Compatibility with the global FIES and the possibility to compile this indicator requires that at least four of the eight FIES items are identified as common.

The Statistics Division at FAO has developed the RM.weights package under R, which provides routines for estimating the parameters of the Rasch model using conditional maximum likelihood, with the possibility to allow for the complex survey design.

### **3.b. Data collection method**

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Face-to-face and telephone interviews within national surveys.

### **3.c. Data collection calendar**

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Continuing

### **3.d. Data release calendar**

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Data are released each year alongside the *State of Food Security and Nutrition in the World* report, usually in mid-July.

### **3.e. Data providers**

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National data providers will be the National Statistical Authorities that are responsible for the survey in which the FIES or similar scale is included. FAO will provide data for countries where the FIES or compatible module is not included in any national survey.

### **3.f. Data compilers**

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Organization(s) responsible for compilation and reporting on this indicator at the global level: Food and Agriculture Organization of the United Nations, Statistics Division, Food Security and Nutrition Statistics Team.

### 3.g. Institutional mandate

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The Office of the Chief Statistician of FAO manages the Interdepartmental Working Group on SDG indicators under the FAO custodianship, and identifies a focal point for each of them. The team leader of the Food Security and Nutrition Statistics Team of the Statistics Division is formally appointed as the focal person for the collection, processing, and dissemination of statistics for this indicator.

### 4.a. Rationale

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Food insecurity at moderate levels of severity is typically associated with the inability to regularly eat healthy, balanced diets. As such, high prevalence of food insecurity at moderate levels can be considered a predictor of various forms of diet-related health conditions in the population, associated with micronutrient deficiency and unbalanced diets. Severe levels of food insecurity, on the other hand, imply a high probability of reduced food intake and therefore can lead to more severe forms of undernutrition, including hunger.

Short questionnaires like the FIES are very easy to administer at limited cost, which is one of the main advantages of their use. The ability to precisely determine the food insecurity status of specific individuals or households, however, is limited by the small number of questions, a reason why assignment of individual respondents to food insecurity classes is best done in probability terms, thus ensuring that estimates of prevalence rates in a population are sufficiently reliable even when based on relatively small sample sizes.

As with any statistical assessment, reliability and precision crucially depend on the quality of the survey design and implementation. One major advantage of the analytic treatment of the data through the Rasch model-based methods is that it permits testing the quality of the data collected and evaluating the likely margin of uncertainty around estimated prevalence rates, which should always be reported.

### 4.b. Comment and limitations

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An average of less than three minutes of survey time is estimated to collect FIES data in a well-conducted face-to-face survey, which should make it possible to include the FIES-SM in a nationally representative survey in every country in the world, at a very reasonable cost. FAO provides versions of the FIES-SM adapted and translated in each of the more than 200 languages and dialects used in the Gallup World Poll.

When used in the Gallup World Poll, with sample sizes of only about 1000 individuals, the width of confidence intervals rarely exceeds 20% of the measured prevalence (that is, prevalence rates of around 50% are estimated with margins of errors of plus or minus 5%). Obviously, confidence intervals are likely to be much smaller when national prevalence rates are estimated using larger samples.

Compared to other proposed non-official indicators of household food insecurity, the FIES based approach has the advantage that food insecurity prevalence rates are directly comparable across population groups and countries. Even if they use similar labels (such as “mild”, “moderate” and “severe” food insecurity) other approaches have yet to demonstrate the formal comparability of the

thresholds used for classification, due to lack of the definition of a proper statistical model that links the values of the “indexes” or “scores” used for classification, to the severity of food insecurity. For this reason, care should be taken when comparing the results obtained with the FIES with those obtained with these other indicators, even if, unfortunately, similar labels are used to describe them.

## 4.c. Method of computation

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Data at the individual or household level is collected by applying an experience-based food security scale questionnaire within a survey. The food security survey module collects answers to questions asking respondents to report the occurrence of several typical experiences and conditions associated with food insecurity. The data is analysed using the Rasch model (also known as one-parameter logistic model, 1-PL), which postulates that the probability of observing an affirmative answer by respondent  $i$  to question  $j$ , is a logistic function of the distance, on an underlying scale of severity, between the position of the respondent,  $a_i$ , and that of the item,  $b_j$ .

$$Prob\{X_{i,j} = Yes\} = \frac{\exp(a_i - b_j)}{1 + \exp(a_i - b_j)}$$

Parameters  $a_i$  and  $b_j$  can be estimated using maximum likelihood procedures. Parameters  $a_i$ , in particular, are interpreted as a measure of the severity of the food security condition for each respondent and are used to classify them into classes of food insecurity.

The FIES considers the three classes of (a) food security or mild food insecurity; b) moderate or severe food insecurity, and (c) severe food insecurity, and estimates the probability of being moderately or severely food insecure ( $p_{mod+sev}$ ) and the probability of being severely food insecure ( $p_{sev}$ ) for each respondent, with  $0 < p_{sev} < p_{mod+sev} < 1$ . The probability of being food secure or mildly food insecure can be obtained as  $p_{fs} = 1 - p_{mod+sev}$ .

Given a representative sample, the prevalence of food insecurity at moderate or severe levels ( $FI_{mod+sev}$ ), and at severe levels ( $FI_{sev}$ ) in the population are computed as the weighted sum of the probability of belonging to the moderate or severe food insecurity class, and to the severe food insecurity class, respectively, of all individual or household respondents in a sample:

$$(1) \quad FI_{mod+sev} = \sum_i p_{i,mod+sev} \times w_i$$

and

$$(2) \quad FI_{sev} = \sum_i p_{i,sev} \times w_i$$

where  $w_i$  are post-stratification weights that indicate the proportion of individual or households in the national population represented by each element in the sample.

It is important to note that if  $w_i$  are individual sampling weights, then the prevalence of food insecurity refers to the total population of individuals, while if they are household weights, the prevalence refers to the population of households. For the calculation of the indicator 2.1.2, objective is to produce a prevalence of individuals. This implies that:

if a survey is at household level, and provides household sampling weights, they should be transformed to individual sampling weights by multiplying the weights by the household size. This individual weighting system can then be used to calculate the individual prevalence rates in formulas (1) and (2)

If the survey includes only adults, then the adult weights applied to the probabilities in formulas (1) and (2) provide the adult prevalence rates ( $FI^{Adults}$ ). In this case, to calculate the prevalence in the total population, then the proportion of children who live in households where at least one adult is



food insecure must also be calculated. This can be done by dividing the adult weights by the number of adults in the household and multiplying those approximate household weights by the number of children in the household. Once the approximate child weights are obtained, the prevalence of food insecurity of children who live in households where at least one adult is food insecure ( $FI^{Children}$ ) can be calculated by applying these weights to the probabilities of food insecurity in formulas (1) and (2). The prevalence of food insecurity in the total population is finally calculated as:

$$FI_{mod+sev} = \frac{FI_{mod+sev}^{Adults} \times N^{Adults} + FI_{mod+sev}^{Children} \times N^{Children}}{N^{Adults} + N^{Children}}$$

and

$$FI_{sev} = \frac{FI_{sev}^{Adults} \times N^{Adults} + FI_{sev}^{Children} \times N^{Children}}{N^{Adults} + N^{Children}}$$

Where  $N^{Adults}$  and  $N^{Children}$  are the adult and children populations in the country.

When applied to the country total population, the prevalence of food insecurity in the total population provides the number of individuals who live in food insecure households (or in households where at least one adult is food insecure) in a country, at different levels of severity ( $N_{mod+sev}$  and  $N_{sev}$ ). In the database, the number of food insecure people are expressed in thousands.

## 4.d. Validation

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For data collected by FAO through the Gallup World Poll or other service providers, the country results have been shared with all national statistical offices through an email communication sent by the FAO Chief Statistician, requesting feedback, and published only if they did not refuse to.

## 4.e. Adjustments

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International calibration of food insecurity thresholds is performed to ensure national and sub-national results are comparable.

## 4.f. Treatment of missing values (i) at country level and (ii) at regional level

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- **At country level**

The indicator is not computed if no country data are available.

- **At regional and global levels**

Missing values for individual countries are implicitly imputed to be equal to the population weighted average of the estimated values of the countries present in the same region.

## 4.g. Regional aggregations

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Regional and global aggregates of the prevalence of moderate or severe food insecurity (FI) based on FIES are computed as:

$$FI_{REG} = (FI_i \times N_i) / N_i$$

where  $FI_i$  are the values of FI estimated for all countries in the regions for which available data allow to compute a reliable estimate, and  $N_i$  the corresponding population size.

## 4.h. Methods and guidance available to countries for the compilation of the data at the national level

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Experience-based food security scales data are collected through population surveys (either household or individual surveys) using questionnaires/modules that are adapted to the country language and condition.

Examples are provided below:

U.S.A.: Household Food Security Survey Module (<https://www.ers.usda.gov/media/8271/hh2012.pdf>)

Brazil: Escala Brasileira de Insegurança Alimentar  
(<http://biblioteca.ibge.gov.br/visualizacao/livros/liv91984.pdf>, Quadro 5, page 30)

Mexico: Escala Mexicana de Seguridad Alimentaria  
([https://www.coneval.org.mx/Evaluacion/ECNCH/Documents/CIESAS\\_alimentacion.pdf](https://www.coneval.org.mx/Evaluacion/ECNCH/Documents/CIESAS_alimentacion.pdf))

Guatemala: Escala Latino Americana y Caribena de Seguridad Alimentaria  
(<http://www.ine.gob.gt/sistema/uploads/2015/12/11/DDrIEuLOPuEcXTcLXab1yOkiOV2HQreq.pdf>, pagina 3)

FAO – Food Insecurity Experience Scale (<http://www.fao.org/3/a-bl404e.pdf>)

Inclusion of the FIES survey module in a questionnaire is a simple matter of adapting the questions to the local language by following guidelines provided in the following documents.

<http://www.fao.org/3/a-be898e.pdf>

<http://www.fao.org/3/a-be898f.pdf>

<http://www.fao.org/3/a-be898s.pdf>

<http://www.fao.org/3/a-be898r.pdf>

<http://www.fao.org/3/a-be898a.pdf>

<http://www.fao.org/3/a-be898c.pdf>

## 4.i. Quality management

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ESS conducts trend analysis of the newly updated indicator with other relevant indicators. Meanwhile, preliminary estimates of each round of the update are circulated among regional offices for review. Because of their knowledge of their regions and countries, they often provide invaluable inputs to the revisions and finalization of the update.

## 4.j. Quality assurance

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FIES data are validated through testing of adherence to the Rasch model assumption of equal discrimination of the items and absence of residual correlation and measurement of Rasch reliability indexes. Such a test would reveal whether the data is of sufficient quality to produce reliable estimates of the prevalence of food insecurity according to the FIES standard.

Then, item severity parameters are compared with the FIES global reference standard to verify the possibility of calibrating the measures against such standard and thus produce estimates of the prevalence of food insecurity that can be considered comparable across countries.

Relevant material is available at <http://www.fao.org/3/a-i4830e.pdf>, <http://www.fao.org/3/b-i4830s.pdf>, <http://www.fao.org/3/c-i4830f.pdf> and <http://www.fao.org/3/a-i3946e.pdf>.

When the estimates are based on official national data, the data used to compile the indicator is obtained directly from the microdata dissemination websites of countries, when available (e.g. USA), or by direct request to the national statistical offices responsible for data collection (e.g. Canada).

## 4.k. Quality assessment

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High. For the vast majority of countries, the quality assurance steps provide indication of high quality and reliable data.

## 5. Data availability and disaggregation

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### Data availability:

Data for 2014-2020 are available from FAO for more than 140 countries, areas and territories included in the Gallup World Poll.

Regional and sub regional aggregates are computed for all regions, with the exceptions of the Caribbean and the Middle Africa regions (as less than 50% of the regional population up to 2019 was covered). Both regions can be estimated only for 2020. Data have been subject to a country consultation process and only results validated by national statistical offices are published at country level.

### Time series:

Only the 3-year average (2014-2016, 2015-17, 2016-18, 2017-19 and 2018-20) is provided for country level data. Annual values are provided for regional aggregates.

### Disaggregation:

As the FIES or any other compatible experience-based food security questionnaire is applied through surveys, the prevalence of food insecurity can be measured in any population group for which the survey used to collect data is representative.

If applied at household level, disaggregation is thus possible based on household characteristics such as location, household income, composition (including for example presence and number of small children, members with disabilities, elderly members, etc.), sex, age and education of the household head, etc. If applied at the individual level, proper disaggregation of the prevalence of food insecurity by sex is possible as the prevalence of food insecurity among male and among female members of the same population group can be measured independently.

When producing disaggregated statistics, attention must be devoted to verifying the validity of the application by estimating the Rasch model with the data from each specific subpopulation group and,

if necessary, perform the appropriate equating of the measure before comparing results.

It is good practice to associate a measure of variability (margins of error or upper and lower bound) when disaggregated data are produced.

At the moment, disaggregated statistics by gender of the respondent are provided.

## 6. Comparability/deviation from international standards

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### Sources of discrepancies:

In the few cases where indicators of food insecurity based on experience-based food security scales have been reported by countries (U.S., Canada, Mexico, Guatemala and Brazil), these have been based on nationally set thresholds that do not correspond to the international thresholds proposed by the FIES. See Annex I and Table A3 in <http://www.fao.org/3/i4830e.pdf> for a description of the differences. In the future, it is desirable that country would start reporting prevalence estimates using also the internationally set thresholds for moderate or severe and severe levels, in addition to those based on national thresholds.

FAO is ready to provide assistance on the analytic methods needed to estimate prevalence based on the FIES global reference thresholds.

## 7. References and Documentation

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URL: <http://www.fao.org/in-action/Voices-of-the-Hungry/>

<http://www.fao.org/3/i4830e.pdf>